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(71) Applicant
Jackson International Pty. Limited

(Incorporated in Australia - New South Wales)

8 Pike Street, Rydalmere, New South Wales 2116, Australia

(72) Inventor
Roy James Jackson

(74) Agent and/or Address for Service
Mathys & Squire
10 Fleet Street, London, EC4Y 1AY, United Kingdom

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A62C 2/12

(52) UK CL (Edition K)
A5A A22

(56) Documents cited
GB 2230951 A GB 2098475 A

(58) Field of search
UK CL (Edition K) A5A A22 A23
INT CL[5] A62C

(54) Adjustable fusible link and fire damper

(57) A fire damper comprising a housing (2), a blade (7) which is movable between an open postion which allows passage of air through the damper and a closed position in which passage of air, fire and combustion products through the damper is substantially prevented, biasing means (8) for biasing the blade (7) toward the closed position, a first hook (19) provided on the housing (2), a second hook (16) provided on the blade (7) and a fusible link (20) for attachment between the first (19) and second (16) hooks to retain the blade (7) in the open position, the fusible link (20) comprising a material which melts at a predetermined temperature to therefore allow the blade (7) to be biased by the biasing means (8) to the closed positioned when the predetermined temperature is reached, wherein at least one of the first (19) and second (16) hooks is arranged to be movable during manufacture of the damper until the link (20) is coupled to both the first (19) and second (16) hooks so that the blade (7) is in the open position and is then adjustable until the correct position is reached whereupon it is fixed in that position.

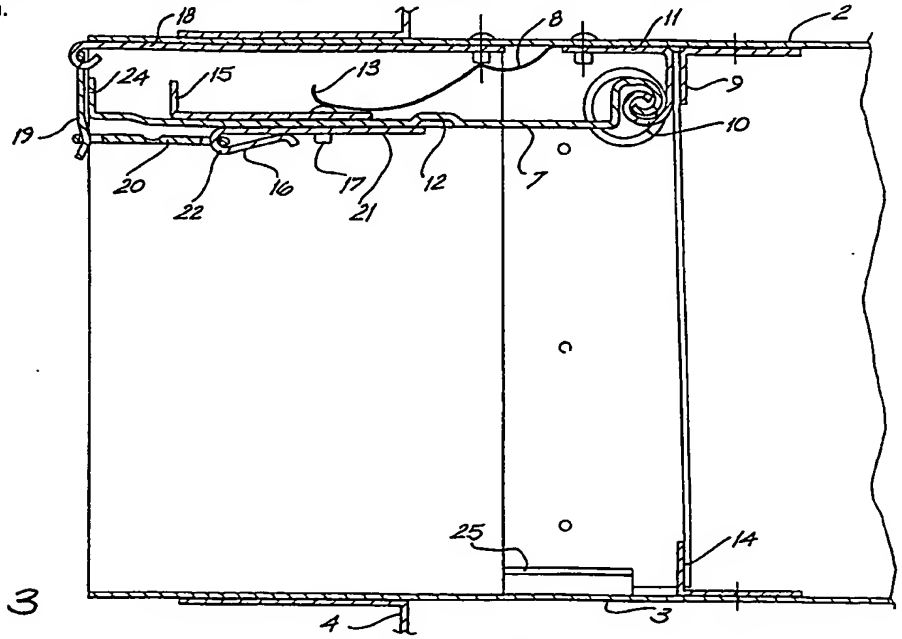

FIG. 3

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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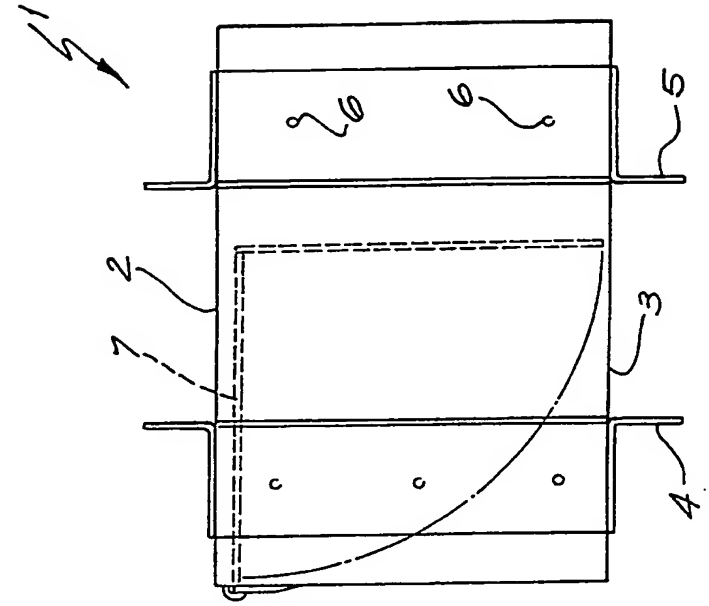

FIG. 2

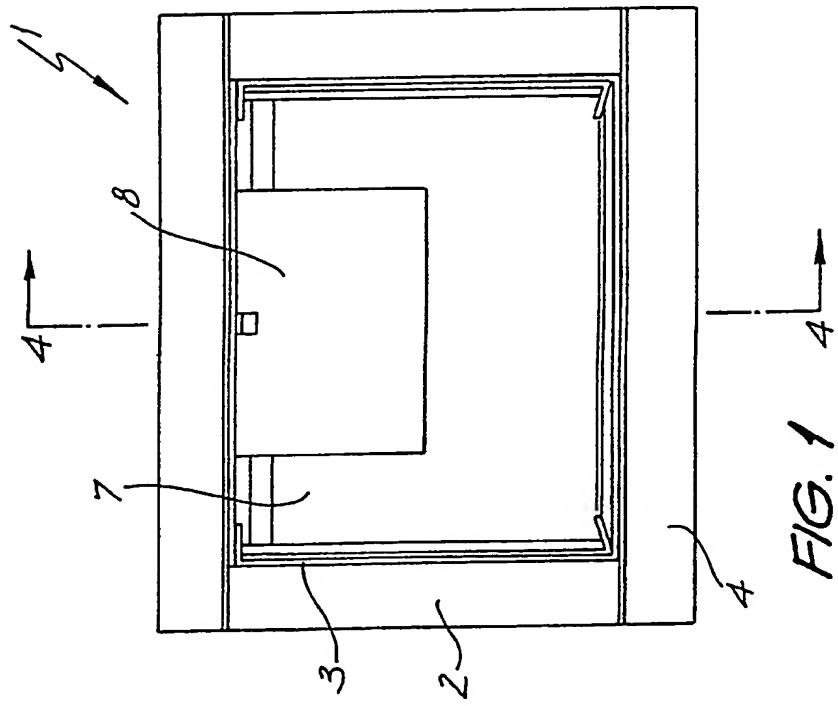

FIG. 1

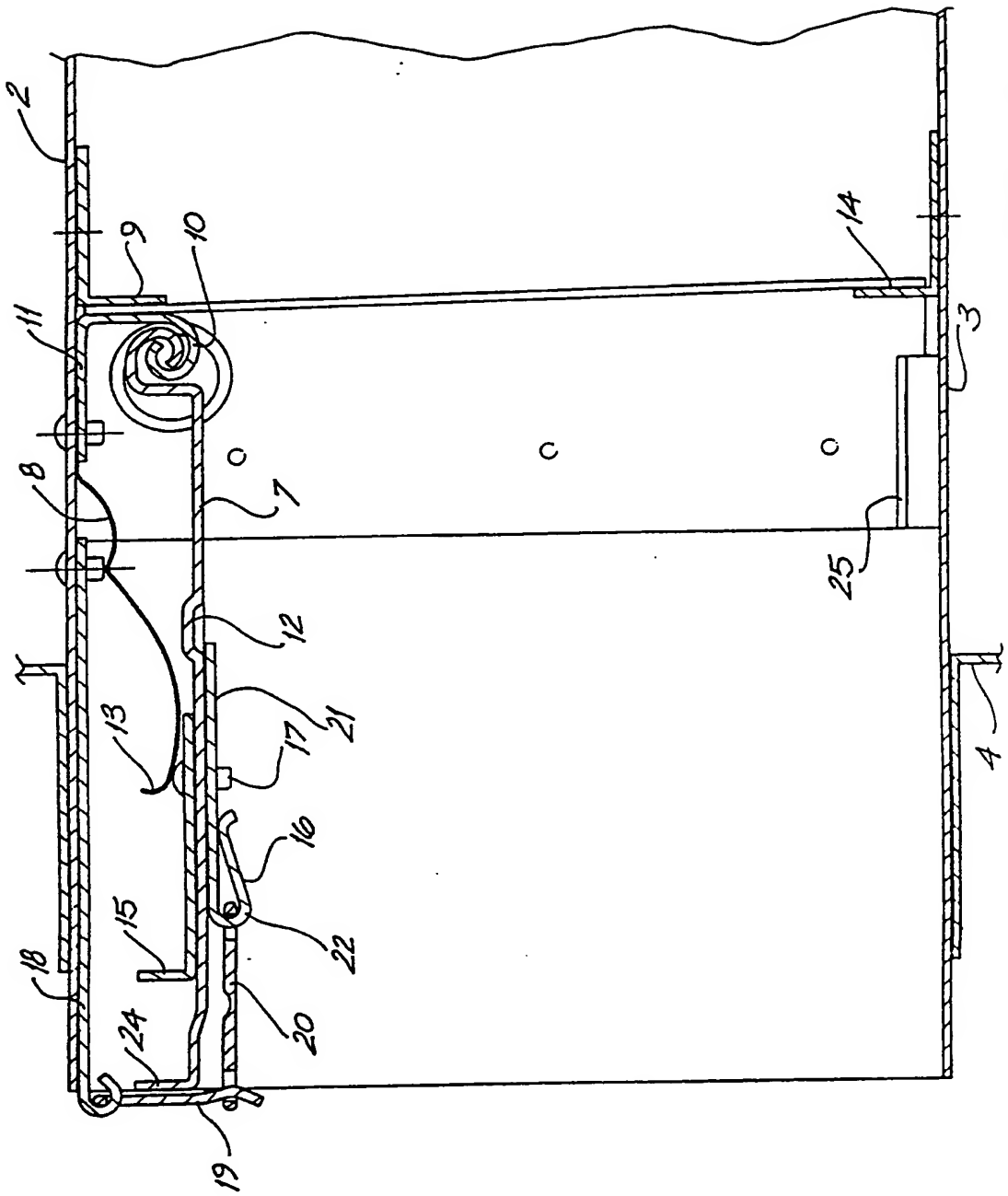

FIG. 3

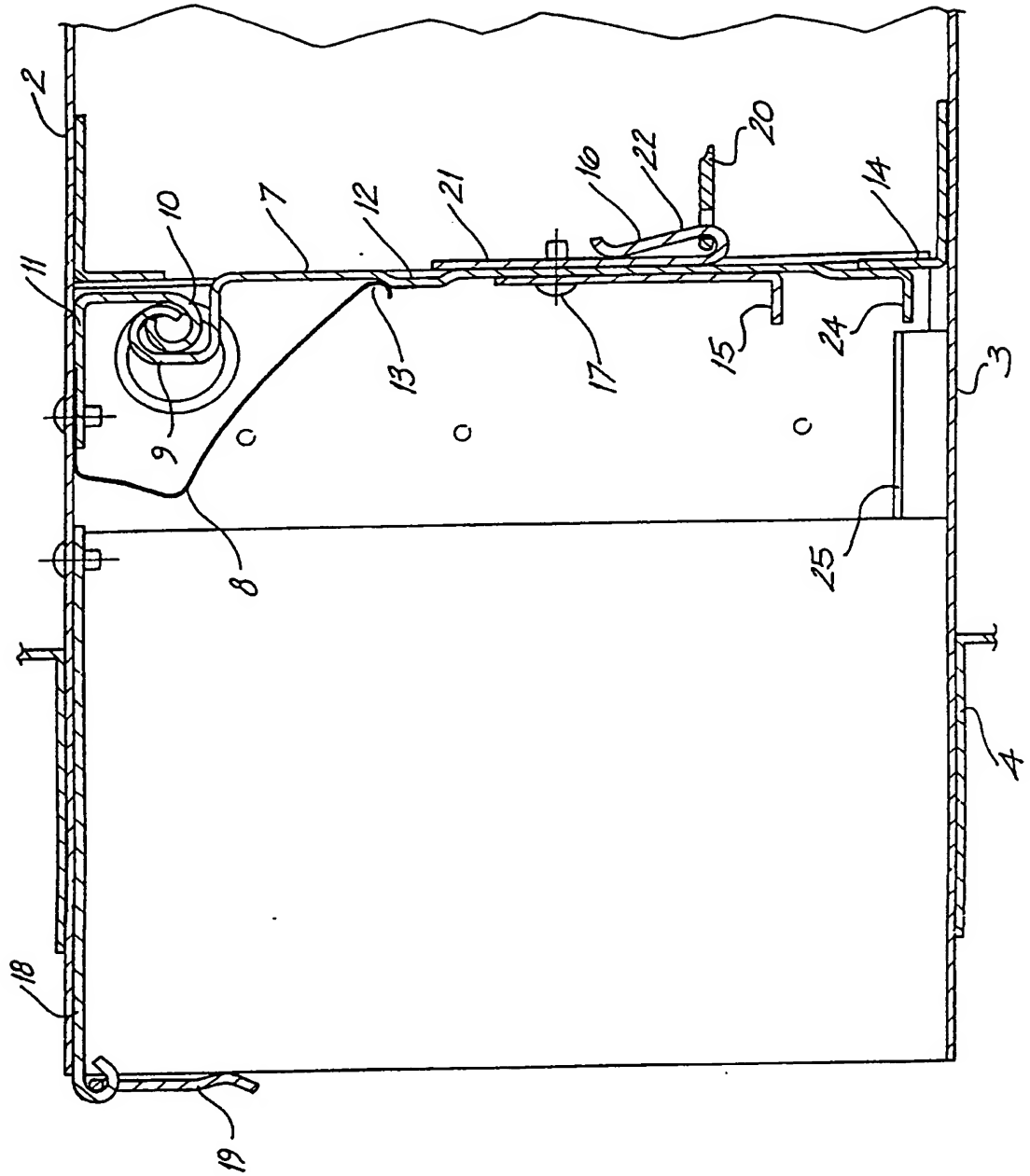

FIG. 4

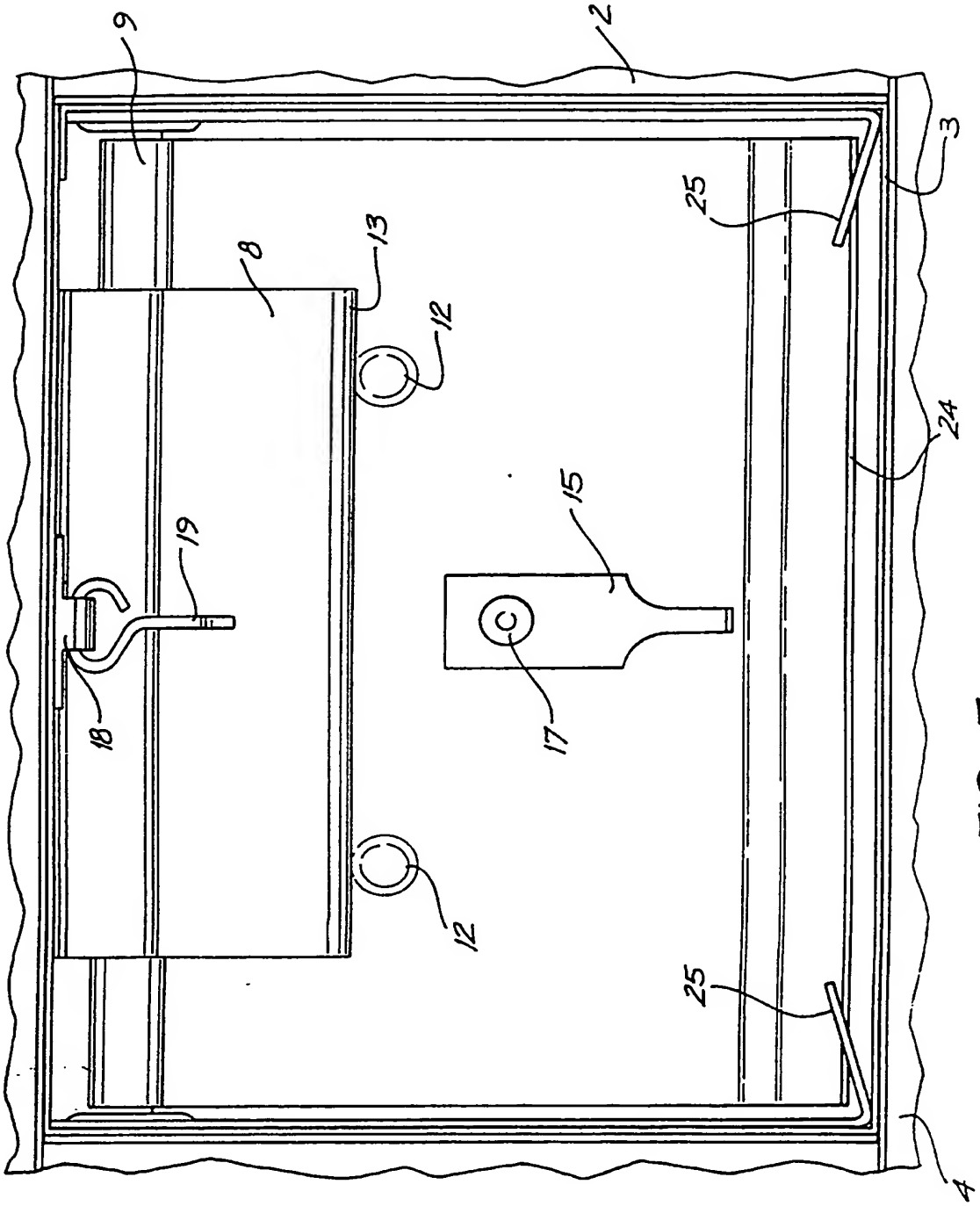

FIG. 5

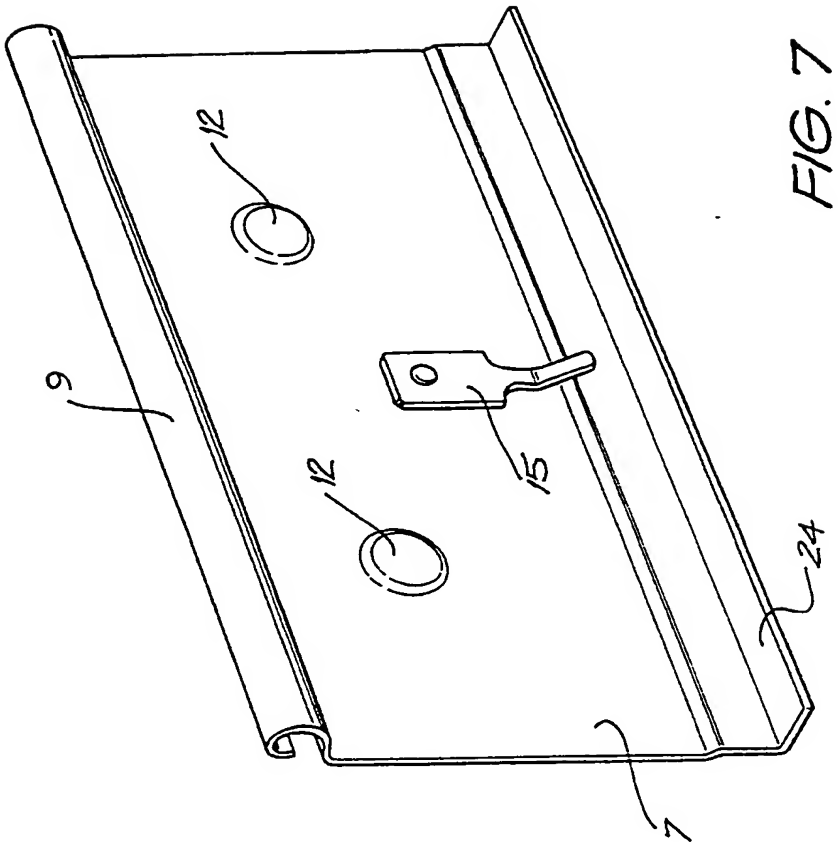

FIG. 7

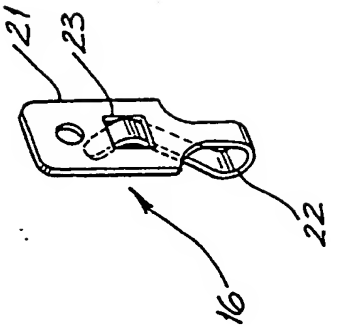

FIG. 6

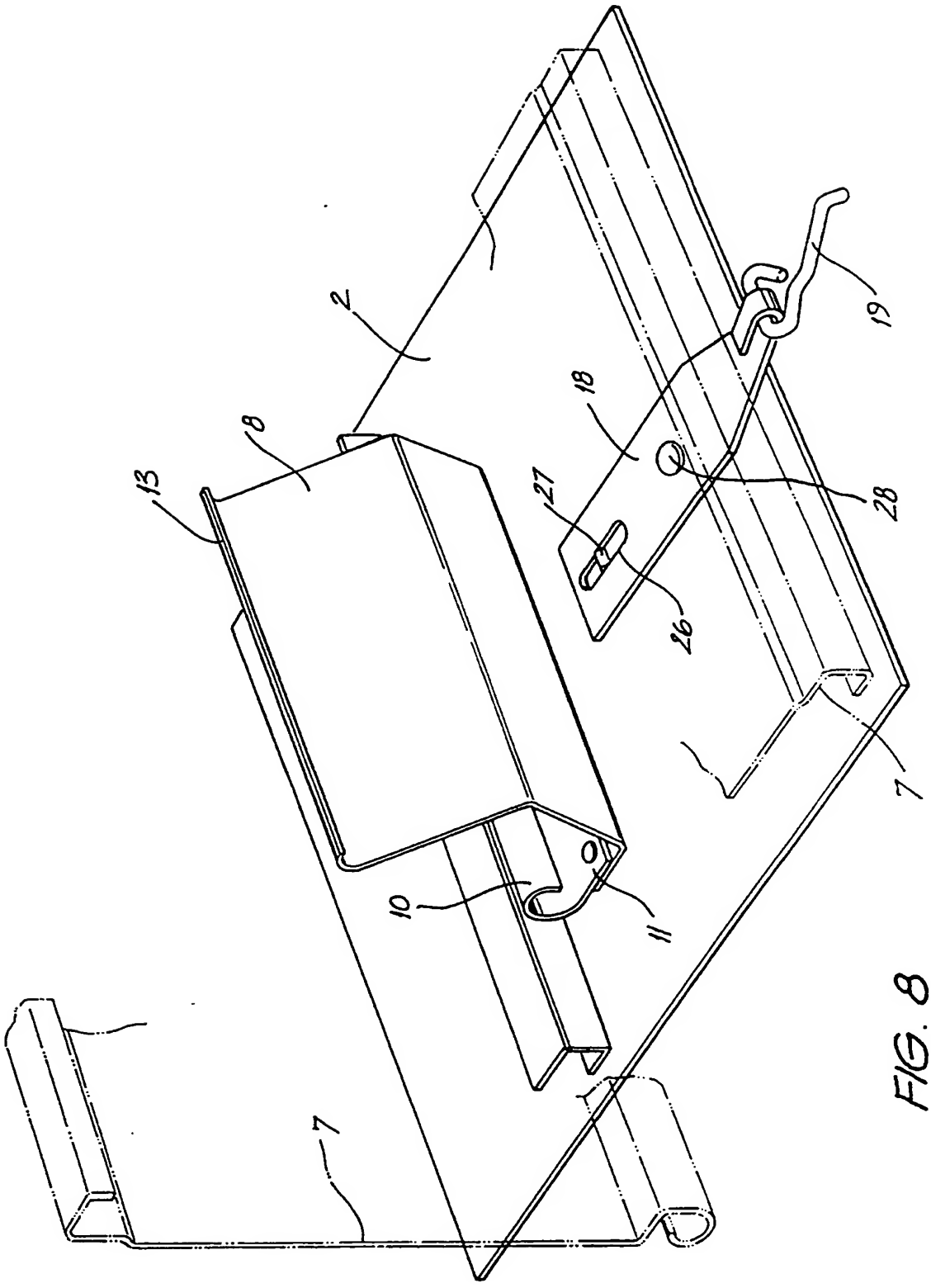

FIG. 8

BACKGROUND OF THE INVENTION

This invention relates to fire dampers, and more particularly to a hook adjusting mechanism for fire dampers.

In buildings having air-conditioning or ventilation systems, the ductwork provided through the building provides a ready means by which fire and products of combustion in any part of the building can spread throughout the building. To impede this spread of fire and products of combustion, according to Australian Standard 1668, fire dampers must be installed in wall, floor and ceiling penetrations which have been formed to permit the installation of air-handling systems.

As described in the foreward to Australian Standard 1682 relating to the requirements for such fire dampers, fire dampers are intended to partially restore the fire resistance of a wall, floor or ceiling through which a penetration has been made. Accordingly, fire dampers must provide an effective barrier to the passage of fire and products of combustion and must be designed and constructed so that they operate under emergency conditions in extreme temperatures.

In general, therefore, a fire damper comprises a housing having external flanges for mounting to the building structure or to the ductwork, and a blade which is generally raised in an open position, but which automatically closes when the temperature increases above a predetermined level due to the presence of fire. The blade is designed to completely close off passage through the damper and therefore prevent spread of fire and products of combustion.

In order to retain the blade in an open position, the blade is restrained, against the bias of a spring, in an open position by means of a fusible link which is hooked over hooks provided on both the blade and the casing of the damper. In the case of a fire, the temperature of the environment rises until the fusible link melts. The blade is then biased downwards to the closed position by the spring.

Clearly, the fusible link needs to be securely retained by the hooks so as to preclude accidental dislodgement and consequent closure of the blade when not required. Equally, the hooks must be in a position which allows the link to be removed and replaced for testing purposes. Therefore, accurate positioning of at least one of the hooks is necessary to compensate for variations in dimensions caused by manufacturing variations.

BRIEF SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a hook adjsting mechanism which can overcome the variations inherent in the manufacturing process.

Accordingly, the invention provides a fire damper comprising a housing, a blade which is movable between an open position which allows passage of air through the damper and a closed position in which passage of air, fire and combustion products through the damper is substantially prevented, biasing means for biasing the blade toward the closed position, a first hook provided on the housing, a second hook provided on the blade and a fusible link for attachment between the first and second hooks to retain the blade in the open position, the fusible link comprising a material which melts at a predetermined temperature to therefore allow the blade to be biased by the biasing means to the closed positioned when the predetermined temperature is reached, wherein at least one of the first and second hooks is arranged to be movable during manufacture of the damper until the link is coupled to both the first and second hooks so that the blade is in the open position and is then adjustable until the correct position is reached whereupon it is fixed in that position.

In a preferred embodiment, the biasing means is a spring, preferably a leaf spring arranged to pivot about an axis at or adjacent to an axis about which the blade pivots between the open and closed positions.

Preferably, the at least one hook is the first hook and is attached to a hook supporting member provided on the housing. The hook supporting member includes adjusting means to allow the first hook to move towards and away from the second hook so as to vary the degree of slack in the coupling of the fusible link to the hooks. The adjusting means preferably comprises a longitudinal slot extending parallel to the longitudinal axis of the fire damper, through which slot a lug on the housing extends so as to limit movement of the hook supporting member to the longitudinal direction.

When the position of the hook supporting member has been accurately determined, it is fixed in position, preferably by means of a dimple fixing process, i.e. by providing a dimple extending through both the housing and the hook supporting member.

BRIEF DESCRIPTION OF THE DRAWINGS

One embodiment of the invention will now be more fully described, by way of example, with reference to the drawings, of which:

Figure 1 is a schematic front elevation of a known fire damper which can incorporate the present invention;

Figure 2 is a schematic side view of the fire damper of Figure 1 showing the open and closed positions thereof;

Figure 3 is a cross-sectional view through the central portion of a fire damper in an open position incorporating the present invention;

Figure 4 is a cross-sectional view similar to that on line 4-4 of Figure 1 through the central portion of a fire damper in a closed position incorporating the present invention;

Figure 5 is a front elevation of the fire damper of Figure 4;

Figure 6 is a perspective view of the blade of the damper;

Figure 7 is a perspective view of a resilient hook for use in the fire damper; and

Figure 8 is a schematic perspective view showing the method of construction of the damper.

DETAILED DESCRIPTION OF THE DRAWINGS

Thus, as shown in Figures 1 and 2, a fire damper 1 comprises a housing 2 formed in the shape of a hollow tube 3 and having a generally rectangular cross-section and being provided with flanges 4 and 5 on the outside of the tube 3 at either end around the periphery thereof. As shown in Figure 2, the flanges are formed of L-shaped members riveted, or otherwise fixed, to the tube 3, as at points 6.

Within the housing 2, there is provided a damper blade 7, which is movable between an open position parallel to one of the four sides of the housing 2, preferably the top face of the housing 2, and a closed position perpendicular to the side of the housing 2. In the open position, the blade 7 permits free movement of air through the tube 3 forming the housing to fire damper 1 and in the closed position the blade is designed to prevent passage of air, fire and combustion products through the fire damper 1. The flanges 4 and 5 are provided in order to mount the fire damper 1 within a wall or other feature of a building which is being penetrated by ducting. The open and closed positions of the blade 7 are shown schematically in Figure 2 of the drawings.

A leaf spring 8 is arranged to bias the blade 7 downwards into the closed position.

As is more clearly shown in Figures 3 and 4, which show the blade closing mechanism in more detail, in the open and closed positions, respectively, the blade 7 is pivoted simply by means of a spiral portion 9 entwining with a corresponding spiral portion 10 of a pivot member 11 fixed to the housing 2. The blade 7 is provided with two dimples 12 spaced apart in the central portion of the blade 7 and positioned so that an end lip 13 of spring 8 abuts the dimples 12 when the blade 7 is in the closed position (Figure 4), thereby biasing the blade 7 downwards, as well as against abutment sealing members 14 provided within the housing 2.

The blade 7 is also provided, on the side facing the spring 8, with a lifting lug 15, and, on the opposite side, with a resilient hook 16. The lifting lug 15 and the resilient hook 16 can be attached to the blade 7 by means of a single rivet 17. On the top face of the housing 2, there is also provided a hook support member 18, to which is coupled a hook 19.

When the blade 7 is in the open position, as shown in Figure 3, a fusible link 20 is coupled between the hook 19 and the resilient hook 16 so as to retain the blade 7 in the open position. The fusible link 20 is made of a material having a relatively low melting point so that, when there is a fire, the fusible link melts at a predetermined temperature, thus releasing the blade 7, which is biased downwards, into the closed position, as shown in Figure 4, by the spring 8.

The resilient hook 16 is formed of spring steel and comprises a base portion 21 attached to the blade 7 and a hook portion 22 which is shaped to return over, and contact, the base portion 21 so as to retain the fusible link 20. In this way, when the operation of the fire damper is being tested, the fusible link 20 cannot get lost and, when the blade is being replaced in the open position after testing, it is a simple matter to hook the fusible link 20 over hook 19, rather than over two hooks as was previously required.

The features of the resilient hook 16 are clearly shown in Figure 7, where one embodiment of the resilient hook includes an aperture 23 in the base portion 21 of the resilient hook to enable closer contact of the hook portion 22 and the base portion 21 to take place.

Figure 6 shows the damper blade 7 with the spiral portion 9 extending along a top edge of the blade and a lip portion 24 extending along the bottom edge thereof. As previously described, the blade 7 is provided with two dimples 12 extending in the direction of the lip

portion 24 and the lifting lug 15. The lip portion 24 of blade 7, as more clearly shown in Figures 4 and 5, abuts the abutment sealing members 14, when in the closed position, and catches behind upturned shoulders 25 provided within the housing in front of the abutment sealing members 14. As the blade 7 moves downwards from the open position to the closed position, the lip portion 24 of the blade passes above the shoulders 25 until the blade abuts the abutment sealing members 14. At this point, the end lip 13 of spring 8, which has been moving upwards along the face of blade 7 from the open position shown in Figure 3 to the closed position closed in Figure 4 abuts the side edges of dimples 12. This causes the blade 7 to move downwards until the lip portion 24 is caught behind shoulders 25. Thus, the blade cannot accidentally be opened again without being lifted against the bias of spring 8 on dimples 12. In order to ease and simplify opening of the blade when testing, the lifting lug 15 is provided on the opposite face of the blade 7 to the resilient hook 16.

Figure 8 shows the top side of housing 2 provided with pivot member 11 and spring 8 in position to receive blade 7, shown in outline form in its open and closed positions. The hook support member 18 is also illustrated as having a slot 26 within which rides a lug 27 formed in the housing 2. Thus, the hook support member 18 can slide into and out of the fire damper during manufacture. Once the blade 7 is in the open position and the fusible link 20 has been coupled over hook 19, the exact position of the hook support member 18 can be adjusted and then is firmly fixed in place by a further dimple 28 passing through both the housing 2 and the hook support member 18. The purpose of this final adjustment is to make sure that there is no play or freedom caused by manufacturing variations which might allow the fusible link 20 to be accidentally detached from hook 19.

Although only one embodiment of a fire damper incorporating the invention has been fully described, it will be apparent that the invention is applicable and can be used in various types of fire dampers and is consequently not limited to the particular one described here.

CLAIMS

1. A fire damper comprising a housing, a blade which is movable between an open position which allows passage of air through the damper and a closed position in which passage of air, fire and combustion products through the damper is substantially prevented, biasing means for biasing the blade toward the closed position, a first hook provided on the housing, a second hook provided on the blade and a fusible link for attachment between the first and second hooks to retain the blade in the open position, the fusible link comprising a material which melts at a predetermined temperature to therefore allow the blade to be biased by the biasing means to the closed positioned when the predetermined temperature is reached, wherein at least one of the first and second hooks is arranged to be movable during manufacture of the damper until the link is coupled to both the first and second hooks so that the blade is in the open position and is then adjustable until the correct position is reached whereupon it is fixed in that position.

2. A fire damper according to claim 1, wherein the biasing means is a spring.

3. A fire damper according to claim 2, wherein the biasing means is a leaf spring arranged to pivot about an axis at or adjacent to an axis about which the blade pivots between the open and closed positions.

4. A fire damper according to any preceding claim, wherein the at least one hook is the first hook and is attached to a hook supporting member provided on the housing.

5. A fire damper according to claim 4, wherein the hook supporting member includes adjusting means to allow the first hook to move towards and away from the second hook so as to vary the degree of slack in the coupling of the fusible link to the hooks.

6. A fire damper according to claim 5, wherein the adjusting means comprises a second longitudinal slot extending parallel to the longitudinal axis of the fire damper, through which second slot a lug on the housing extends so as to limit movement of the hook supporting member in the longitudinal direction.

7. A fire damper according to any one of claims 4 to 6, wherein, when the position of the hook supporting member has been accurately determined, it is fixed in position by means of a dimple fixing process, i.e. by providing a dimple extending through both the housing and the hook supporting member.

8. A fire damper substantially as hereinbefore described with reference to the drawings.

Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

Application number

9204880.0

Relevant Technical fields

(i) UK Cl (Edition K) A5A (A22, A23)

(ii) Int Cl (Edition 5) A62C

Search Examiner

DR D ELSY

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

22 JULY 1992

Documents considered relevant following a search in respect of claims 1-8

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2230951 A (NAILOR-HART) - see page 3 line 16-page 4 line 13, page 11 line 3-page 12 and Figures 1 and 3	1-4
X	GB 2098475 A (TATUM) - see Figures 5 and 8	1-4

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

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